



(11) EP 1 031 947 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:  
30.08.2000 Bulletin 2000/35

(51) Int. Cl.<sup>7</sup>: G07C 5/08

(21) Application number: 00103386.9

(22) Date of filing: 24.02.2000

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(72) Inventor: Ohashi, Tamaki  
Tanashi-shi, Tokyo (JP)

(74) Representative:  
Riederer Freiherr von Paar zu Schönau, Anton  
Lederer, Keller & Riederer,  
Postfach 26 64  
84010 Landshut (DE)

(30) Priority: 26.02.1999 JP 9530299  
03.02.2000 JP 2000064152

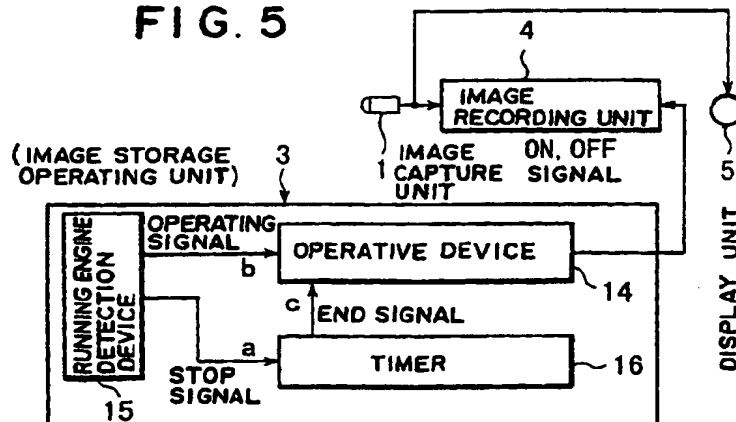
(71) Applicant: Tuner Corporation  
Tanashi-shi, Tokyo (JP)

(54) Car-mounted image record system having an operative device for storing images

(57) There is provided a car-mounted image recording system having an image storage operating unit 3, wherein the running state of a driver's car is recorded as a document material enabling the effective investigation of the cause of any accident the car happens to have. The image storage operating unit 3 includes a running engine detection device 15 for outputting an engine stop signal "a" in response to the stop of an engine, and for outputting an engine start signal "b" in response to the start of engine, a timer 16, which operates for a fixed time in response to the engine stop signal "a" inputted

form the running engine detection device 15, and an operative device 14 for generating an ON signal in response to the engine start signal "b" inputted from the running engine detection device 15, while generating an OFF signal in response to an operation end signal "c" inputted from the timer 16, and thereby controls the operation of an image recording unit 4 through the ON and OFF signals generated from the operative device 14.

FIG. 5



BEST AVAILABLE COPY

EP 1 031 947 A2

## Description

### BACKGROUND OF THE INVENTION

[0001] The present invention relates to a car-mounted image recording system in which images of the view outside of the car are captured by image capture devices mounted outside of a driver's seat area, and recorded by a record device mounted in the car. Particularly, the car-mounted recording system relating to the present invention captures images of a movement of the driver's car by the image capture device, the images to be recorded by the record device as information source image, and the driver recognizes that all states of the driver's running or stopping the car are recorded by the system. The car driver is aware of his safe driving, since the captured images include an image of the road surface in relationship with his car and other images of outside of the driver's car. The captured images will be best able to be used for evidencing the running state of the driver's car at the moment and just before when an auto accident is caused, so that it is made clear why the accident is caused. Thus, the car-mounted image recording system reminds the driver of that the practicing of safe driving is very important to him.

### THE SOLVING PROBLEM OF THE INVENTION

[0002] Until today, an automobile is one of the necessities of life, which is quite indispensable for people these days, whereas it is a murderous weapon on wheels. There is a presumption that auto accidents claim lives of more than ten thousand people for a year all over the world. In this connection, it can be estimated that people several tens of times as many as the people killed in the accident were injured. Therefore, it can be said that the car driver is always in much danger. For this reason, the car driver is placed under an obligation to get a driver's license in order to drive a car, as regulated by traffic laws, and can not drive a car without the driver's license.

[0003] The legal controls will not be imposed on the car driver, as soon as he got the driver's license. When the car driver has any particular business, he will try to accelerate his car. Although the traffic laws control the dangerous driving, the car driver's mental state is not restrained by the traffic laws. Since the traffic laws alone do not establish safe driving, it is no exaggeration to say that the traffic laws will not prevent the current increase in the auto accidents. The increase in the auto accidents requires more strict traffic rules for preventing the auto accidents, but any strict traffic rules will not prevent the increase in the auto accidents, because the thinking of the car driver that he would like to speed up, overcomes the safe driving. Thus, there is no hope that the traffic laws alone should establish the decrease in the auto accidents.

[0004] When the drivers drive their car, they will be enclosed by doors in their cars and cut off in communication with the outside world. Many drivers have the feeling that they are in a closed world. For that reason, once a driver starts taking the wheel, he/she will have a tendency to completely change his personality, further tending to cause traffic accidents.

[0005] All car drivers had to take driving lessons and learn traffic regulations in driving schools to obtain a driving license, before they actually drive a car. The driving schools instruct the drivers to drive a car with safety and to observe traffic regulations. Although the driving schools enable the car driver to drive a car, safe driving depends on the car driver's manner. Resultantly, the number of traffic accidents will not be decreased.

[0006] Everyone desires that the traffic accidents should disappear from the world. For this reason, many drivers try to adopt a safe driving, sticking respective stickers on the windows of the car. Their sticker's inscripts are e.g. "This car is driven keeping to the traffic rules", "This car is driven at a speed less than 80 km per hour even on a highway", or "After you, this car is driven aside by traffic rules". It is noted that when the car driver had a traffic accident without his fault, declaring safe driving, it is difficult for him to attest his safe driving without any monitoring device. A way to prove safe driving should be considered.

[0007] Generally, the facts of evidence of the traffic accident will be attested, based on the position where a car was finally stopped, the directions in which objective cars lie, the damage state of the objective cars, or on wheel tracks left on the road surface and etc. However, it is difficult to find a real cause of the auto accident. According to the circumstances, the cause of the auto accident will not be found. For example, even though a driver has driven a car safely, when he has an accident, he will have to explain his safe driving. However, his explanation only will be interpreted as his evasive answer, unless his safe driving is attested. Consequently, even if the driver who drove his car safely, it may be judged that the accident was caused from his car. In another example, when a real victim of the auto accident who has been driving his car safely or carefully before the accident, is dead, it also may be judged that the auto accident has been caused from his car. It is impossible to make the dead driver explain his safe driving himself. Consequently, his bereaved family may be claimed to pay a lot of money in compensation for the accident.

[0008] The description goes back to the original subject. Firstly, it is necessary to give examples why so many traffic accidents are caused. For example, when one car stopped for a moment before passing an intersection, another car comes from the right or left side of the intersection and then has a minor collision with the stopped car; when one car stopped for a moment before entering a main line from a branch line, another car coming from the main line has a minor collision with the

stopped car, or when one car runs straight on the road, another car coming from the side has a minor collision with the side of the car running straight. As understood from the above examples, it is a very important problem for us to know which of the cars in fact stopped for a moment or ran straight, in order to really clear up the causes of the traffic accidents.

[0009] Considering the above examples, it will be understood that the most important evidence is the movement of the driver's running or stopping car at the moment and just before when an auto accident was caused. In other words, if partial images of the driver's car including the road surface in relationship with the movement of the car, the road surface back, ahead or at the side of the car and view outside of the car are captured and recorded, the safe driving can be attested.

#### PRIOR ART

[0010] The prior art that best exemplifies one of systems related to the above car-mounted image recording system, is known from Japanese unexamined patent publication of No. 1993(Heisei 5)-20592 (Kumagai). The publication discloses a method for recording information on surroundings and the running state of the driver's car, and a system therefore. The system records the information for a predetermined time before a traffic accident was caused.

[0011] The system according to the prior art comprises: an image capture device for capturing the image of a view outside of and ahead of the car as image input information; a controller for controlling the image capture device such that the image capture device operates at the start of the engine and stops by detecting a stop signal from the engine, the controller having functions for inputting and outputting at least one of the data time, speed, acceleration and deceleration; and a record device for recording the output datum from the controller.

[0012] The image capture device in the system is mounted on a dashboard in the cabin of the car or in vicinity of the radiator grill outside of the cabin. Such the image capture device can capture only the image of view outside of and ahead of the car.

[0013] The image capture device according to the prior art could capture a partial image of the road surface on which the car is running. The image capture device was designed so as to capture a general image of the view changing outside of the running car, whereby the relationship between the driver's car and other objects was made clear. Consequently, the system according to the prior art could not control the driver's mental state, because the system could not monitor the movement of the driver's car. For this reason, in most cases, the image capture device according to the prior art could not provide sufficient evidence for testifying the movement of the driver's car. As understood from the above context under the headline "Solv-

ing the problem of the invention", it is particularly most important to know the movement of the driver's car to clear up the evidence of the traffic accident, when the driver caused an auto accident himself or when a secondary traffic accident is caused next to the accident that the driver's car caused.

[0014] In addition, the image record device in the system according to the prior art had the function of starting its operation upon detecting the start signal from the engine, but stopping the operation upon detecting the stop signal from the engine. However, the system according to the prior art will fail to provide the advantages thereof sufficiently. For example, when a driver stopped his car for getting foods or beverages from a convenience store or a hamburger shop, the driver stopped the engine in his car and disappeared from his car. Baggage in his car might be stolen. Thus, it will be considered that the system according to the prior art could not provide a record thereof. When the driver stopped his car for an instant, stopping the engine, or when the engine in the driver's car was accidentally stopped due to any causes, and other cars collided with or crashed into the driver's car, the system according to the prior art will fail to provide a sufficient evidence of the correct behaviour.

#### SUMMARY OF THE INVENTION

[0015] In view of the foregoing, a car-mounted image recording system according to the present invention includes image capture devices (hereinafter, cameras) mounted at the driver's car for capturing images of a partial body of the car, including the road surface, and a view outside of the car in relationship with the movement of the car. Furthermore, the car-mounted image recording system can always record the images captured during the time when the driver drives his car.

[0016] In addition, the system according to the present invention enables the driver to examine the operating state of the cameras. When the driver knows that the cameras operate well, he - driving his car - will probably feel that the cameras will keep watch on his driving manner because of the fact that the cameras in the system according to the present invention can capture, in detail, images of a partial body of his car, including the road surface on the ground near the body of his car, the road surface ahead, back or at the side of his car, and the view outside of his car. Therefore, when the driver drives his car, he will recognize at any time that the cameras always watch his driving manner, and will be conscious of concentrating his attention on a correct and safe driving which does not cause him to make a mistake. It is apparent from the foregoing that the system according to the present invention always captures, and records images of the movement of the car, and controls the driver.

[0017] In finding the cause of traffic accidents, the recorded information, as an important piece of evi-

dence, has to remain in the car-mounted image recording system, as above described. Nothing must be wrong with the system at the time when an accident is caused. Therefore, it is important for the driver to examine the operating state of the system as often as possible during driving, and it is also important for the system to permit the operating state of the system to be examined by the driver at any time. Thereby, the system will be prevented from the problem of not having operated well at the time the driver had an accident.

[0018] Accordingly a most important subject of the present invention is to enable the driver to inspect if each of the cameras operates in the normal state at any time. The inspection has to be made repeatedly.

[0019] For example, even though a driver makes a point of examining the system, he will often forget it without thinking. Therefore, it is necessary to enable the driver to examine the operating state of the system easily or without difficulty.

[0020] Towards the attainment of the aforesaid primary object of the invention, the car-mounted image recording system according to the present invention includes the function of displaying the images that were captured by the cameras.

[0021] The driver can check right and left around a crossroad and look back for putting the car into the garage. At the same time, the driver will be able to examine the operating state of the system, the cameras. The system according to the present invention includes a display device which is mounted near or in front of the driver's seat in the car, so that the driver can easily examine the operating state of cameras. The display device permits a function such that images of selected cameras are displayed or either of the images on a display is changed into the images of the selected cameras. For example, the driver can look at the images of the selected cameras on the display, or can change the images shown on the display at an instant by only touching an operation panel, e.g. before passing a crossroad. Thereby, the driver never fails to inspect the operating state of the cameras, while looking at images of the view around the crossroad, for his safety. In other words, the driver can inevitably examine the operating state of the cameras in the system without deepening his awareness of the examination, while driving or using the car.

[0022] It is apparent from the foregoing that the system according to the present invention provides the function of facilitating the regular inspection greatly. As a result, the car drivers always feel that the cameras watch their driving manner. Thus, when the drivers drive their car, they concentrate their attention on the following of the traffic laws and the safe driving. This is quite important to decrease the number of traffic accidents.

[0023] The system is operable, so that the image capture devices can automatically continue to capture images for a fixed time after the engine was stopped.

[0024] In addition, the system according to the

present invention permits the operation that the image capture devices operate to capture the images for a predetermined time set by the driver after the engine stopped.

[0025] In further addition, the system according to the present invention permits the operation that the image capture device operates to capture images for a time even extending the predetermined time after the engine was stopped, when the driver sets the extension of the time on the operation panel.

[0026] It is apparent from the foregoing that the system according to the present invention permits operations such that the image capture devices operate to capture images during the interval when the engine runs, and to automatically capture images in succession after the engine stopped.

[0027] In addition, the system according to the present invention includes: image recorders for recording the images captured by the image capture devices; a timer which operates for the fixed time after the engine was stopped; and the operative device for generating a start signal for starting the capture and record of the images after the engine was started, and a stop signal for stopping the capture and record of the images in response to the stopping operation of the timer, so that the operation of the image recorders is controlled through the start and stop signals from the operative device.

[0028] It is apparent from the foregoing that the system according to the present invention enables the driver to stop the capture and record of the images, and to cancel the stopping of the capture and record of the images.

[0029] In addition, the system according to the present invention includes a time-setting device enabling the driver to set a desirable time, the time-setting device operating after the engine was stopped; and an operative device for outputting a start signal for starting the storage of the images at the time when the engine is started, while outputting a stop signal for stopping the storage of further images at the time when the time-setting device ends the operation, so that the operation of the recorders is controlled by the start and stop signals from the operative device.

[0030] It is apparent from the foregoing that the system according to the present invention enables the driver to extend the fixed time of the timer by setting a desirable time through the time-setting device, after the engine was stopped.

[0031] In addition, the system according to the present invention includes a cancelling device to permit the store of the images in the recorders to be cancelled by the driver.

[0032] In further addition, the above cancelling device can automatically cancel the stopped state of the store of images in the recorders in response to the start of the engine.

## BRIEF DESCRIPTION OF THE DRAWINGS

### [0033]

FIG. 1 is a view depicting areas which are just under and in the vicinity of a car.

FIG. 2 is a plan view illustrating the car having a car-mounted image recording system mounted therein.

FIG. 3 is a side view of the car of Fig. 2.

FIG. 4 is a view depicting the design of a car-mounted image recording system.

FIG. 5 is a block diagram illustrating an image storage operating unit according to a first embodiment.

FIG. 6 is a time chart depicting a time operation of the image storage operating unit.

FIG. 7 is a block diagram illustrating an image storage operating unit according to a second embodiment.

FIG. 8 is a block diagram illustrating an image storage operating unit according to a third embodiment.

FIG. 9 is a block diagram illustrating an image storage operating unit according to a fourth embodiment, which corresponds to FIG. 5.

FIG. 10 is a block diagram illustrating an image storage operating unit according to the fourth embodiment, which correspond to FIG. 7.

FIG. 11 is a block diagram illustrating an image storage operating unit according to a fifth embodiment, which corresponds to FIG. 8.

## PREFERRED EMBODIMENTS OF THE PRESENT INVENTION

[0034] Referring now to the drawings, description of the embodiments according to the present invention will be made hereinafter.

### 1. Construction of the car-mounted image recording system

[0035] Referring to FIG. 4, the car-mounted image recording system according to the present invention includes an image capture unit 1, an image storage operating unit 3, an image recording unit 4, a display unit 5, and a day/time information writing device 6.

[0036] The car-mounted image recording system according to the present invention is mounted to a car P, as illustrated in FIGS. 2, 3. Firstly, it should be understood that the car mounting the system according to present invention includes various kinds of car types, including large-sized, stock, compact, sub compact, and custom-made cars, and a passenger car P is only given in the drawings as an example.

[0037] Referring to FIG. 1, a transversely elongated rectangular-shaped line P' having the contour of the car P is shown as projecting parallel rays right under the car P, which surrounds an area A indicated by cross oblique

lines. The area A shows a location just under the car P. An area B indicated by unilaterally oblique lines outside of the line P' and surrounding the area A shows an area on the ground in the immediate vicinity of the car P.

### 2. Image Capture Unit

[0038] Referring to FIGS. 2 and 3, the car P mounts an image capture unit 1 in the car mounted image recording system. The image capture unit 1 comprises a plurality of CCD cameras of the kind used for devices such as a video camera, a digital electronic camera, and etc. The image capture unit 1 includes: four road surface looking cameras 1a to 1d for each capturing images of a part of the body of the car P and of the road surface in relation with the movement of the car P, preferably, a road surface on the ground near to the body of the car; a front-looking camera 1e for capturing an image of a part of the body of the car P, of the road surface ahead of the car P and of the view outside of the car P; and a back-looking camera 1f for capturing an image of a part of the body of the car P, of the road surface back of the car P and of the view outside of the car P. The road surface image capture cameras 1a, 1b are mounted looking downwardly and symmetrically at the flanks of the roof adjacent the side edges thereof on both sides of the top surface and at the distal end thereof in or at the car P. Thus, the road surface-looking cameras 1a, 1b allow to capture images of a part of the body of the car P, and the road surface in the area on both sides of and close to the car P. The road surface-looking cameras 1c, 1d are mounted looking downwardly and symmetrically at the flanks of the roof adjacent the side edges thereof on both sides of the top surface and at the proximal end thereof in or at the car P. Thus, the road surface looking cameras 1c, 1d enable capturing images of a part of the body of the car P, and the road surface in the area on both sides of and close to the car P. Furthermore, the road surface looking cameras 1a and 1b, and 1c and 1d enable capturing images of the road surface in the area on both sides of and close to the body of the car P so as to in part overlap each other.

[0039] It will be understood that since the road surface looking cameras are mounted at a high level of a body in or at the car, this enables capturing images of the road surface in the vicinity of the body of the car within a wide area thereof, including a partial view of the body of the car.

[0040] The front-looking camera 1e is mounted substantially midway between the ends of the ceiling near the distal end thereof in or at the car P and is directed to the area ahead of the driver thereof. It enables capturing an image of a front part of the body of the car P of the road surface extending ahead of the car and of the forward view from the car P. The back-looking camera 1f is mounted substantially midway between the ends of the ceiling near the proximal end thereof in or at

the car P and is directed to the area in back thereof. It enables capturing an image of a rear part of the rear body of the car P, of the road surface extending back of the car and of the backward view from the car P.

[0041] The field of view of each of the cameras may perhaps be further clarified by considering certain specific cases. For example, the cameras enable capturing images of views outside of the car P, which include, for examples, the shoulder of a road, a guardrail, a traffic sign painted on the road, the outlook etc., in addition to a partial view of the body of the car P. Therefore, each of the cameras can capture the image of not only the relation between the car P and the road surface in the area on the ground near the car P but also the circumference around the car P. Thus, in the case when the car P has an accident, the images which are captured by the cameras and are recorded provide for a beneficial contribution to the evidencing of the accident as a clear and fair material, because the detail information on the scene of the accident and the movement immediately before the accident of the car P would be recorded.

[0042] In FIGS. 2 and 3, the directions in which each of the cameras capture images are indicated by arrows, and the area of the road surface, in which the cameras can capture images, is denoted as D. The V shaped area indicated by the arrows that diverge from each of the cameras is depicted as setting the angle of view at 60 degrees, but the camera angle is for purpose of illustration only and is not to be understood as limiting value. Preferably, the angle of view is effective from 50 to 85 degrees as considered from the apex at the respective camera mounted at its positions, from the conveniently simplified adjustment at the mounting, and from the elapse displacement of the cameras, as caused by vibration of the car P.

[0043] With the foregoing in mind, it may be stated that the angle of view necessary for the cameras can be set individually according to the circumference of the mounted positions thereof, because in the case where each of the cameras has a wide angle lens, the camera will provide a widespread image of many objects nearer it, or in the case where a camera has a telephoto lens, the camera will provide an image enlarging the objects remote from the camera.

[0044] The purpose of the car-mounted image recording system according to the present invention is firstly to capture the images of a part of the body of the car P and a part of the road surface in relation with the car P, thus illustrating the relation between the body of the car P and the objects outside thereof, including the road surface on the ground near the body of the car P and the road surfaces extending ahead of, back of or at both sides of the car P. Of course, it will be understood that in all cases above described, each of the cameras can capture the image of the part of the body etc. from the mounted position thereof.

[0045] In addition, it will be realized from the foregoing that the road surface looking cameras 1a, 1b may be

mounted at side mirrors projecting from the side edges on both sides of the body of the car P, if they are only to capture the relation between a part of the body of the car P and the objects outside of the car P including the road surface on the ground near the body and the road surfaces extending forward, rearward or at both sides thereof.

[0046] In further addition, it may be stated that the road surface looking cameras 1a to 1d may carry each a device for cleaning the lens at the front thereof, which is easily soiled, and additionally may be accommodated in a waterproof protective case that permits the capture direction of the camera to be adjusted. Therefore, even though soil is sputtered up against the car by an oncoming car or a car running side by side on a muddy road, not much of the sputtered soil will adhere to the cameras.

[0047] Since the road surface looking cameras are mounted at a high level in or at the body of the car, they can capture the images of a part of the body and of the road surface near the body detecting a relatively wide area.

[0048] The aforesaid number of 6 (six) cameras constituting the image capture unit 1 are for purposes of illustration only and are not to be understood as a limiting value. It should be understood that the number of the cameras varies in accordance with the condition existing, for example, with the form and size of the car. The installation of the cameras is required to capture images of the area around the body of the car completely without generating blind spots. Some areas may overlap. The number of the cameras is increased not only in accordance with the number of the positions where the cameras are mounted, but also in accordance with the cases where different types of cameras are mounted side by side. For example, respective cameras having different directivity may be mounted at the same position, respective cameras having different angles of view may be mounted at the same position, a camera for night may be mounted side by side with a camera for daytime, or a stand-by camera may be mounted side by side with the active camera.

### 3. Image recording unit

[0049] Referring now to FIG. 4, an image recording unit 4 records the images captured by the image capture unit 1. The image recording unit 4 includes recorder 8 used each with a record medium such as a film, videotape, optical disc, magnetic disc, semiconductor memory, etc.

[0050] The recorders 8 are accommodated in a box disposed under a rear seat in the car P, because the rear seat is in minor danger of being damaged when the car P has an accident. The recorders 8 are bunched in two groups as groups A and B. The groups A and B comprise each six recorders 8a to 8f, 8a' to 8f' for recording the images captured by the cameras 1a to 1f,

respectively.

[0051] The group "A" comprised of the recorders 8a to 8f is accommodated in a box which permits the record medium to be easily taken out and changed, and which is comparatively convenient to handle. The group B comprised of the recorders 8a' to 8f' is accommodated in a protective box which has excellent mechanical strength resistant to damage and which has an airtight construction in a slightly depressurized state.

[0052] The record media described above were only given as examples. It should be understood that the recorders 8 in the image recording unit 4 are applicable for various types of record media which will appear in the future.

[0053] The image recording unit 4 starts recording or storing the images captured by the respective cameras, after the engine (re)started running. The respective images after the restart are recorded from the point where the captured images before the restart have been stopped on the magnetic tape. The recorders in the image recording unit 4 have each a plurality of magnetic tapes for recording or storing the images, i.e. the image recording unit 4 enables a function according to which the images captured by the image capture unit 1 as information are recorded endlessly, because when the first magnetic tapes end up in the recorders, the recorders can record the images on second tapes which have been activated slightly before the first magnetic tapes were ended.

[0054] If the driver who had driven the car P happened to have an accident, all the images conjunct with the accident can be reproduced from the recorders 8 in the image recording unit 4. Therefore, the system according to the present invention can provide all materials necessary for investigating the reasons for the accident.

[0055] As above described, one group of the recorders in the image recording unit 4, i.e. the recorders 8a' to 8f', are accommodated in a protective box having excellent mechanical strength. Therefore, even if the car P was badly damaged or destroyed by fire after the accident, the images recorded or stored in the respective recorders 8a' to 8f' can be reproduced without being affected, and thereby the course of the accident will be cleared up.

[0056] The construction of the system is simplified and compact-sized, because the images captured by the cameras are each stored in the recorder, whereby the wiring is simplified. An inexpensive system will be provided.

#### 4. Display Unit

[0057] Again referring to FIG. 4, the images captured by the image capture unit 1 or recorded by the image recording unit 4 are displayed on a display 10a or 10b in the display unit 5. The display unit 5 includes a selection switch 9 and a synthetic adapter 11.

[0058] The display unit 5 is disposed at the position where it attracts the driver's attention, for example, at the dashboard in his car, because the purpose of the present invention is to enable the driver to examine the operating state of the system, of each of the cameras, so as to avoid that when he happens to have an accident, the cameras had failed to capture the images which had to be recorded, for reasons such as a directional shift of the cameras, lenses soiled from mud or rain, the snapping of a wire or the breakdown of a camera, and for the reason that the driver does not know the breakdown of the cameras. However, the driver can examine the operating state of the system by checking right and left before passage of a crossroad intersection, or checking the back, when putting his car into a garage.

[0059] Entering into detail, the display unit 5 disposed inside the car includes the function of testing the operation of the cameras. For example, the driver can look easily at the images of any cameras that are displayed on the displays 10a, 10b in the display unit 5, after having changed the images from the cameras instantaneously only by touching an operation panel, before passing a crossroad. Thus, the driver can test the operation of the cameras at any time, while checking right and left so as to drive his car safely.

[0060] From the foregoing, it will be appreciated also that the driver can inspect the operating state of the system without deepening his conscious to now examining this state.

[0061] The selection switch 9 permits the function of selecting the images that are to be displayed on the displays 10a, 10b, from the images captured by the respective cameras. Through a synthetic adapter 11, an image of the images captured by respective cameras, images of the television programs, and an image of the car navigation enter into a single screen.

[0062] Since the captured images can be displayed during the time when a driver drives, the driver can check the circumference around his car so as to drive safely. At the same time, the driver can soon realize if a damage and breakage of the image capture device, a gap relative to the direction of capture, etc. has occurred, by examining the reflection by images in which the operating state of the image capture device is displayed at all times. Therefore, the driver can always cope with an unexpected accident; the system will obtain a high accuracy. As a result, the driver will always concentrate his attention on the safe driving. He can examine the operating state of the respective cameras in an instant, because the displays in the display unit enable him to look at all the images captured by the plurality of cameras at the same time, which images were gathered into a single screen. Accordingly, the driver can check the circumference around his car for safe driving during the time when he drives. There is no need for providing additional devices for examining the respective cameras. The system will obtain a compact

design, and a free installation inside the car.

**[0063]** As above described, it will be obvious that the driver can change the images that will be displayed on the displays 10a, 10b, at will in an instant by only touching the operation panel, that is the selection switch 9 in the display unit 5 disposed at the position where for example, the dashboard lies in his car, so as to look at the images displayed on the displays 10a, 10b, so that the driver can drive his car safely, checking the circumference around his car.

**[0064]** In addition to the foregoing, it will be obvious that the driver can look at any of the images which the respective cameras capture, the images captured by the cameras, the images of the television programs, or the image of navigation, enter into a single screen through a synthetic adapter 11, on the display 10a, 10b.

**[0065]** As an example, the cameras 1a, 1c in the image capture unit 1 shown in FIG. 4 are identical to the road surface looking cameras 1a, 1c mounted at the distal and proximal ends of the roof on the left side thereof at the car P, as shown in FIG. 2. The driver can look at the images displayed on the displays, which are captured by the cameras 1a, 1c, before his car will turn to the left. At that time, the driver can check the road surface at the area near the body of the car P, for his safe driving, and thereby he can always examine and know whether the system operates normally to capture the images or if the system is broken.

**[0066]** In further addition to the foregoing, it will be obvious that the driver can check the operating state of all the cameras in the system at an instant, because when he selects the images which simultaneously enter into a single screen through the synthetic adapter 11, he can look at all the images which enter into the single screen on the displays 10a, 10b. Thus, since the driver can save his trouble of selecting the images captured by the cameras in the system separately, he can always check the operating state of all the cameras at a time, so as to drive his car safely and carefully.

**[0067]** It is, of course, noted that the driver can check the operating state of the system while the car is stopped in front of, for example, his house, by looking at the images which have been already recorded by the recorders to be displayed by display 10a, 10b.

#### 5. Date/time information writing device

**[0068]** The car-mounted image recording system according to the present invention contains the day/time information writing device 6 shown in FIG 4. The day/time information writing device 6 is adapted to writing date/time information on the time when the images were captured by the respective cameras in the image capture unit 1, on the images recorded by the respective recorders in the image recording unit 4. Thereby, after the driver had an accident, when any or all of the images recorded by the respective recorders in the recording unit 4 are selected by the selection switch 9 in

the display unit 5, the day/time information is displayed on the display 10a, 10b in the display unit 5. When the images recorded by the respective recorder in the image recording unit 4 are reproduced to be displayed on the display in the display unit 5 at the different times, the images can be adjusted to the same time by selecting the images through the selection switch 9, based on the day/time information. Thereby, the images fit to the same scene captured by the respective cameras at the same time. Therefore, it can be said that the images captured by the respective cameras and recorded by the respective recorders will be beneficial for the driver to evidence his safe driving without fault.

**[0069]** It is apparent from the foregoing that even if a driver had an accident, anyone can identify the date/time when the image capture unit 1 has captured the images and the image recording unit 4 has recorded the images, because the date/time information writing device 6 had written the date/time information on the captured and recorded images. Since the captured and recorded images necessary for the investigation of the causes of the accident each provide common date/time information that was additionally written by the date/time information writing device 6, anyone can look exactly at the images that enter into a single screen on the display in the display unit 5, without a time lag. Furthermore, in the case where the respective recorders fail to consistently operate, e.g. since the play-back occurs mechanically, the operator will easily correct the insufficient operation of the recorders, based on the date/time information that is displayed in the images which the recorders reproduces.

**[0070]** In addition to the aforesaid date/time information, to further aid in more exactly testifying the safe driving for the driver who had driven the car P, it is contemplated to obtain information on the speed of the car P, on brake and turn signals, and further on shock sounds caused by the accident, sound of brake applied, chime sound of pedestrian crossing, Klaxon, sound inside or outside of the car P, etc., collected from a mike mounted together with the cameras. Thereby, even if all of the cameras were broken or the cameras failed to face the objects for any reason, after an accident the system will provide some fair evidence of the safe driving.

**[0071]** Some embodiments which provide beneficial features of the present invention will next be described in detail.

#### 50 First Embodiment

**[0072]** An embodiment is described that enables the car-mounted image recording system to provide the function that the image recording unit 4 continues to operate for a fixed time, for example, 1 (one) hour, after the engine was stopped.

## 1. Image storage operating unit

- [0073] The image storage operating unit 3 shown in FIG. 4 is illustrated in considerable detail in FIG. 5 which is a block diagram according to the first embodiment.

[0074] The image storage operating unit 3 permits a function by which the operation of the image recording unit 4 is maintained for the fixed time after the engine was stopped. The image storage operating unit 3 includes: a running engine detection device 15 for detecting the start or stop of the running of the engine through for example, a tachometer used for the engine and having a drive circuit; a timer 16 adapted to operating for the fixed time, for example, 1 hour, in response to an engine stop signal "a" to be inputted from the engine running detection device 15; and an operative device 14 for generating an ON signal, i.e. an image storage starting signal, in response to an operating signal "b" to be inputted from the running engine detection device 15, while generating an OFF signal, i.e. an image storage stopping signal, in response to an operation end signal "c" to be inputted from the timer 16.

[0075] Accordingly, the car-mounted image recording system according to the present invention is operable, as will be described below, so that after the engine was started with for example, an engine key, the operating signal "b" is firstly inputted to the operative device 14 from the running engine detection device 15 in response to the driving of the tachometer for the engine, thereby the ON signal is generated by the operative device 14, and the image capture unit 1 starts the operation of capturing the images of parts of the body of the car P, of the road surface and of views outside of the car P in relation with the movement of the car P, by the respective cameras, while the recorders 8a to 8f and 8a' to 8f' in the image recording unit 4 start the operation of recording or storing the images captured by the respective cameras in the image capture unit 1, in response to the ON signal inputted from the operative device 14. The described embodiment also includes the date/time information writing device 6 disposed therein for writing the date/time information on the images captured by the respective cameras and recorded or stored in the recorders 8a to 8f and 8a' to 8f'.

## 2. Timer

[0076] The system according to the present invention is operable so that the image capture unit 1 continues to capture images, while the image recording unit 4 continues to record the captured images, during the engine running.

[0077] In addition, the system according to the present invention has the timer 16 for delaying the generation of the OFF signal from the operative device 14 by a fixed time, for example, 1 (one) hour in response to the engine stop signal "a" from the engine tachometer, when the running of the engine was stopped.

[0078] Accordingly, the system is operable, as described below, so that the timer 16 inputs the operation end signal "c" to the operative device 14 to cause the OFF signal to be generated from the operative device 14, only after the fixed time has elapsed, and then the image recording unit 4 stops recording or storing the captured images, in response to the OFF signal from the operative device 14.

[0079] Thus, the car-mounted image recording system is operable so that the image-recording unit 4 can continue to record the images captured by the image capture unit 1 for the fixed time, after the running of the engine was stopped. In cases, as for example where a driver parked the car P to leave from his car for a minute to make some purchases in a convenience store and to eat and drink in a fast food restaurant, or where a driver stopped his car at the roadside on the way to rest for a minute, the image capture unit 4 can capture images of the circumference around his car and can record and store the captured images. Thus, the car-mounted image recording system will record or store images which capture the circumference where baggage from the car is stolen, where the body of the car is damaged, or where other cars collide with the car during parking. The recording or storing state of the image-recording unit is indicated by a time chart, as shown in FIG. 6, I, wherein level H, and level L indicates the image-recording state, and the stopped state of the image-recording, respectively.

[0080] In the case where the engine is restarted during the operation of the timer, after the engine was stopped, then the images will continue to be captured and recorded or stored, now in response to the operation signal "b", and the timer will be cancelled.

## Second Embodiment

[0081] A modified embodiment permits the car-mounted image recording system to provide the function that the driver can set at will a predetermined time, or a free set time which is the period of time between the time when he stops the engine and the time when he will come back to the car P from the shopping, drinking and eating.

[0082] Referring to FIG 7, the image storage operating unit 3 again comprises the running engine detection device 15, the operative device 14, and further a time setting device 17 replacing the timer 16 which was shown in FIG. 5 with reference to the first embodiment.

## Time setting device

[0083] As illustrated in FIG. 7, the time setting device 17 includes a plurality of elements 18 operatively connected therewith for setting predetermined times and endless time (free set time), the elements enabling the setting of for example, 1(one) hour, 2(two) hours, 4(four) hours, 8(eight) hours, 16(sixteen) hours, 24

hours, and endless, respectively.

[0084] The elements 18 each may be provided as for example, panel switches in the operation panel. Thereby, the driver can select for example, 2(two) hours by touching a mark which is indicated as 2(two) on one of the panel switches provided in the operation panel in the system, so that the time setting device 17 records the selected time of 2 hours. The time setting device 17 might be operatively connected with a speech recognition device. In this case, when the driver utters a vocal sound, for example, two hours, the time setting device 17 will operate.

[0085] If the engine stop signal "a" is inputted to the time setting device 17 from the running engine detection device 15 after the engine was stopped, the time setting device 17 enables the system to operate so that the image recording unit 4 can continue to record or store the captured images for two hours after the engine was stopped.

[0086] Description in now will be made in further detail of the operation to the time setting device, with reference to the time chart II, as shown in FIG. 6.

[0087] The time setting operation means a point in time when a driver sets a setting time of the time setting device 17 to a predetermined time, for example, two hours. After the engine was stopped, the operation signal "b" is inputted to the operative device 14 from the running engine detection device. When the two hours elapse after the engine was stopped, the time setting device 17 will input an operation stop signal c' to the operative device 14, as shown in FIG. 7. Thus, the time setting device 17 inputs the operation end signal "c'" to the operative device 14 at the point in time, "image storage stopped", after the two hours elapsed, as indicated in FIG. 6, a time chart II.

[0088] Accordingly, the car-mounted image recording system is operable so that after the engine was stopped, when the driver set the switch-off time of the time setting device 17 to a predetermined time, for example, 2 hours, the image recording unit 4 will continue to record or store the captured images for 2 hours after the stop of the engine, and when the end signal c' is inputted to the operative device 14 from the time setting device 17 after the 2 hours elapsed, the image recording unit 4 will stop the operation.

### Third Embodiment

#### Priority Circuit

[0089] According to the second embodiment described above, it was understood that the operation time for the image recording unit 4 after the stop of engine could be freely set. Considering now that the image recording unit 4 fails to perform the operation, after the engine was stopped, because the driver forgot to set a predetermined time by the element 18. For example, the driver thought that he would like to set the

time of the time setting device 17 to 2 hours, after parking his car, but without thinking he forgot to do so when he parked his car.

[0090] In view of the foregoing, the image storage operating unit 3 according to this third embodiment includes the timer 16 that was stated in the first embodiment, the time setting device 17 that was stated in the second embodiment, and a priority circuit 19, as shown in FIG. 8.

[0091] The priority circuit 19 operates to give priority to an operation end signal c' sent from the time setting signal over the operation end signal c sent from the timer 16 to permit the operation end signal c' to be inputted to the operative device 14 therefrom.

[0092] When the driver selects a time, for example, 2(two) hours by one of the elements 18 operatively connected with the time setting device 17, before the engine is stopped, the time setting device will store the two hours' data of the element 18. The priority circuit is provided between the timer 16 or the time setting device 17 and the operative device 14. The priority circuit 19 operates so as to switch the circuit through from which the end signal "c" or "c'" is inputted, wherein the time setting device 17 takes priority over the timer 16. The priority circuit 19 switches the circuit in response to a priority signal "d" inputted from the element 18.

[0093] It is noted that when one of the elements 18 is optionally selected, the time setting device 17 has priority to the element that was finally selected by the driver.

[0094] In this third embodiment of the image storage operating unit 3 having the priority circuit 19 between the timer 16 or the time setting device 17 and the operative device 14, the car-mounted image recording system is operable, after the engine was stopped, as described below.

[0095] After the engine was stopped, stop signal "a" will be inputted to both the timer 16 and the time setting device 17 from the running engine detection device 15, whereby the timer 16 and the time setting device 17 start their operations. As above described, the image recording unit 4 continues to perform the operation for the fixed time after the engine was stopped. Normally, after the fixed time elapsed, the image recording unit 4 would stop recording or storing the captured images. However, if the time selected by the element 18 was stored in the time setting device 17, the priority circuit 19 will give priority to the operation end signal c' from the time setting device 17 over the operation end signal "c" from the timer 16, whereby the operation end signal c' is inputted to the operative device 14 from the time setting device 17 through the priority circuit 19. Thus, the ON signal is sent from the operative device 14 to the image recording unit 4, so that the image recording unit 4 will continue to record the captured images.

[0096] In addition, in the case where the set time has not been selected by the element 18 before the engine was stopped, when the fixed time elapses after

the engine was stopped, the operation end signal "c" will be inputted to the operative device 14 from the timer 16 through the priority circuit 19, as any set time is not stored in the time setting device 17, whereby the OFF signal is generated from the operative device 14 so as to stop the operation of the image capture unit 1 and the image recording unit 4.

#### Fourth Embodiment

##### Forced change-over switch & arbitrary selection switch

**[0097]** According to any of the above embodiments, the image storage operating unit 3 operated so as to cause the ON signal to be generated from the operative device 14 in response to the operating signal "b" sent from the running engine detection device 15, while the OFF signal was generated from the operative device 14 in response to the operation end signal "c" from the timer device 16 or the operation end signal "c'" from the time setting device 17, whereby the image recording unit 4 was controlled. It now may happen that when a driver is driving his car, or when a driver is stopping for an instant his car without stopping the engine, he wants to stop the operation of the image recording unit 4 for a minute.

**[0098]** The problem pointed out hereinbefore is solved by an image storage operating unit 3 as illustrated in FIGS. 9 to 11. In these drawings, the addition of a forced change-over switch 20a is shown. The forced change-over switch 20a comprises a push-typed switch which enables the driver to change the ON, OFF states of the operation of the image recording unit 4 at every push. The forced change-over switch 20a is connected with an arbitrary selection switch 20. The arbitrary selection switch 20 operates to select either of: the opening state where the operative device 14 does not establish an electrical contact with the image recording unit 4, or the closing state where the operative device 14 establishes an electrical contact with the image recording unit 4, in response to the operation which the driver drives on ON or OFF of the forced change-over switch 20a.

**[0099]** In the embodiment of the image storage operating unit 3 having both the forced change-over switch 20a and the arbitrary selection switch 20, when a driver wants to stop the image recording unit 4 for an instant, he will operate the forced change-over switch 20a. The forced change-over switch 20a transmits a selection signal "e" to the arbitrary selection switch 20, so that the circuit between the operative device 14 and the image recording unit 4 is no longer caused to be conducting. The ON signal will not be sent from the operative device 14 to the image recording unit 4. Thereby, the operation of the image recording unit 4 will be stopped.

**[0100]** Referring to the time chart IV in FIG. 6, the driver can cancel the stopped operation of the image

recording unit 4, the beginning of which is indicated as a stopping operation in chart IV, by pushing the forced change-over switch 20a, as indicated as a returning operation therein. When the forced change-over switch 20a is pushed again during the stopped state of the image recording unit 4, the operative device 14 will establish an electrical contact with the image recording unit 4. Thereby, the operation of the image recording unit 4 will re-start.

**[0101]** It is to be noted that when the operation of the image recording unit 4 is stopped, the stopped state may be displayed by any device which provides a function for displaying it (not shown).

**[0102]** When a driver stopped the operation of the image recording unit 4 by pushing the forced change-over switch 20a for OFF, and later on he stops the engine in his car, he might forget to push the forced change-over switch 20a for ON. For this reason, the stopped operation of the image recording unit 4 will be kept. For example, in the case where the driver entered his car into the garage adjacent to his house, even though the engine is restarted by the driver, the operative device 14 will not be able to transmit the ON signal to the image recording unit 4, because the arbitrary selection switch 20 does not provide electrical contact between the operative device 14 and the image recording unit 4, for the reason that the driver had pushed the forced change-over switch 20a for OFF before entering into his house. In this embodiment as shown in FIG. 9 to 11, when the engine is restarted in the state where the stopped operation of the image recording unit 4 is kept by the forced change-over switch, after the operation signal from the running engine detection device 15 is inputted to the arbitrary selection switch 20, the arbitrary selection switch will output the ON signal to the image recording unit 4, so as to solve the problem that even though the engine is restarted, the image recording unit 4 fails to perform the operation. Thereby, the image recording unit 4 will be automatically return from the stopped state to operation.

**[0103]** Referring to the time chart III in FIG. 6, the driver stops the operation of the image recording unit 4, as indicated as a stopping operation therein. After he stops the engine, as indicated as an engine stop therein, he now restarts the engine. At that time, the image recording unit 4 will automatically start recording or storing images.

**[0104]** It is to be noted that the arbitrary selection switch 20 is not limited to the construction of a push-type switch. The selection signal "e" may be outputted through a speech recognition device, which can recognize the voice for changing the operation, so as to cause the arbitrary selection switch 20 to or not to establish electrical contact between the operative device 14 and the image recording unit 4. Also, the arbitrary selection switch 20 alone may recognize the speech so as to or not to establish electrical contact between the operative device 14 and the image recording unit 4.

[0105] It will be understood from the foregoing that the car-mounted image recording system according to the present invention will be able to provide the important materials in which the safe driving of the driver who had driven the car P will be testified, because the image capture unit 1 can capture the images of a part of the body of the car P, of the road surface and of the view outside of the car P in relation to the movement of the car P, in detail, for a fixed period time between the time when the engine in the car P is started and the time when the engine is stopped.

#### EFFECTS OF THE PRESENT INVENTION

[0106] In the system according to the prior arts, in which an image of the view outside of the car around it relative to the running direction was captured, the system could record images of other cars which had caused an accident and the circumference around a place where an accident had had been caused, but could not record the road surface on the ground near the body of the car in an instant before and just before the accident was caused. Such the system will not be able to clear up the movement of the driver's car mounting the system, and to monitor the driving manner of the driver. Considering such the disadvantages of the system according to the prior arts, the system according to the present invention will be more beneficial.

[0107] As above described, according to the present invention, the image capture unit can capture images of the running state of the driver's car, that is, a partial body of the driver's car, including the road surface and views outside of the car in relation to the movement of the car, and the image recording unit can automatically record or store the driving state in detail for a period of time between the time when the engine is started and the time when the engine is stopped and for a fixed time. Therefore, the system will provide most important material, the images of a partial body of the driver's car, including the road surface and the view outside of the car in relation to the movement of the car, that is considered so as to exactly give evidence of the movement of the driver's car, because the image recording unit in the system can reproduce the recorded or stored images of the material.

[0108] It is not too much to say that if a driver mounts the system according to the present invention on his car, he will keep to the safe driving. This is an evidence that the driver made a declaration of safe driving. As the driver can testify his safe driving, he will drive his car without anxiety. The driver will contribute to a decrease in the number of traffic accidents.

[0109] Thus, it can be said that this invention is inevitable one, which promotes the safe driving. If it is generalized to mount the system according to the present invention on all cars, the accidents will be rapidly reduced not only in Japan, but also in all over the world.

[0110] According to the present invention, in the case where a driver stops the engine of his car in a parking area to leave from the car for a minute, when baggage is stolen from the car, when a partial body of the car is damaged, or when the car has a minor collision or a collision with other cars, the system will provide the important material necessary for investigating the cause of the accident, because the image recording unit can record or store the images of the circumference, which are captured before and after the accidents.

[0111] Particularly, according to the present invention, the system has the advantage to enable setting at will a time for operating the image recording unit, after the engine was stopped.

[0112] According to the present invention, the system has the advantage to enable automatically operating the image recording unit for a fixed time, after the engine was stopped, even if the manual control of the time setting device is failed.

[0113] According to the present invention, the system provides the convenient functions of which the user can control at will the recording or storing of the images during the engine running.

[0114] In addition to the foregoing, according to the present invention, the system has the advantage to prevent incorrect action, which might be caused by the stop device, because the state where the image recording unit was deactivated by the stop device is cancelled by re-starting the engine.

#### Claims

1. A car-mounted image recording system to be mounted in or at a motor car having an engine and adapted to running on a road surface, said system including:

image capture means (1) having at least one or more image capture devices (1a, ..., 1f), each of the image capture devices capturing an image of a part of the body of said car, of a part of the road surface and possibly of further objects outside of said car in relation to the movement of said car;

image record/storage means (4) for recording or storing the images captured by the image capture means (1); and

image storage operating means (3) adapted to permitting said image capture means (1) and said image record/storage means (4) to be operated according to a timing program taking into account the engine running or stopping status.

2. The car-mounted image recording system as defined in claim 1, wherein the image storage operating means (3) is adapted to permitting said image

capture means (1) and said image record/storage means (4) to be operated for a predetermined time, while the engine runs in the car, and to be automatically and continuously operated after the engine is stopped.

3. The car-mounted image recording system as defined in claim 1 or 2, wherein said image storage operating device (3) is adapted to permitting the operation of said image record/storage means (4) to be stopped at will by an operator of said system.
4. The car-mounted image recording system as defined in claim 3, wherein said image storage operating device (3) is adapted to permitting the stopped operation of said image record/storage means to be cancelled at will by the operator of said system.
5. The car-mounted image recording system as defined in any of claims 1 to 4, wherein said image storage operating means (3) is adapted to permitting said image capture means (1) and said image record/storage means (4) to be active during the time when the engine is running, and to be further automatically continuously active for a predetermined time after the engine is stopped, the predetermined time being set by an operator of the system.
6. The car-mounted image recording system as defined in any of claims 1 to 5, wherein said image storage operating means (3) is adapted to permitting said image capture means (1) and said image record/storage means (4) to be operated during the time when the engine is running, and to be further automatically continuously active for a first predetermined time (from 16) after the engine is stopped, and is adapted to permitting said image capture means (1) and said image record/storage means (4) to be automatically continuously active for a second predetermined time (from 17, 18) after the engine is stopped, the second predetermined time being set at will by an operator of the system, the second predetermined time having priority (19) over the first predetermined time.
7. The car-mounted image recording system as defined in any of claims 1 to 6, wherein said image storage operating system (3) includes:

timer means (16), which operates for a predetermined time in response to a stop of the engine; and  
operative means (14, 20a, 20) for generating an image storage start signal adapted to permitting the operation of said image capture means (1) and said image record/storage

means (4) to be started in response to the stop of the engine, and for generating an image storage end signal adapted to permitting the operation of said image capture means (1) and said image record/storage means (4) to be ended in response to the termination of operation of said timer means (16), whereby the operation of said image record/storage means (4) is controlled in accordance with said image storage start signal and said image storage end signal from said operative means (14, 20a, 20).

8. The car-mounted image recording system as defined in claim 7, wherein said image storage operating means (3) includes time setting means (17, 18) for setting a predetermined time during which the image storage is active starting from the engine being stopped, the predetermined time being set by an operator of said system.
9. The car-mounted image recording system as defined in claim 8 if referred to claim 3, wherein said image storage operating means (3) includes stop means (20a) for stopping the operation of said image record/storage means (4), the stop means being operated at will by the operator of the system.
10. The car-mounted image recording system as defined in any of claims 1 to 9, wherein said image storage operating system (3) includes time setting means (16), which operates for a predetermined time in response to a stop of the engine; and operative means (14), which are adapted to generating an image storage start signal in response to a start of the engine, and to generate an image storage end signal in response to the termination of operation of said time setting means (16), whereby the operation of said image record/storage means (4) is controlled in accordance with said image storage start signal and said image storage end signal from said operative means.
11. The car-mounted image recording system as defined in any of claims 1 to 10, which system comprises display means (5, 10a, 10b) adapted to displaying the captured images of said image capture means (1) or the recorded or stored images of said image record/storage means (4); and wherein the image storage operating means include running engine detection means (15), either of timer means (16) or time setting means (17, 18), or both of timer means or time setting means, and operative means (14);

said running engine detection means (15) being adapted to outputting an operation signal (b) to the operative means (14) therefrom when the engine starts, and to output an operation

stop signal (a) to the timer means (16) or time setting means (17, 18) therefrom when the engine stops;

said timer means (16) being adapted to performing the operations of starting a first predetermined period of time in response to the stop signal (a) inputted from said running engine detection means (15), and of outputting a first end signal (c) to said operative means (14) after the period of time is terminated;

said time setting means (17, 18) having at least one or more time setting elements (18), which enable an operator of the system to set a second predetermined period of time at will, the time setting means being adapted to performing the operation of starting the second period of time in response to the stop signal (a) inputted from said running engine detection means (15), and of outputting a second end signal (c') to said operative means (14) after the second period of time is terminated; and

said operative means (14) being adapted to outputting an ON signal to said image record/storage means (4) in response to the operation signal (6) inputted from said engine detection means (15), and to outputting an OFF signal to said image record/storage means in response to the first end signal (c) inputted from said timer means (16) or the second end signal (C') inputted from said time setting means (17, 18).

12. The car-mounted image recording system as defined in claim 11, wherein said image storage operating means (3) includes both of said timer means (16) and said time setting means (17, 18), one of said time setting elements in the time setting means being adapted to outputting a priority signal (d) to a priority means (19) when the second period of time is set by the operator of the system before the engine is stopped, and the priority means is adapted to giving priority to said time setting means (17, 18) over said timer means (16).

FIG. 1

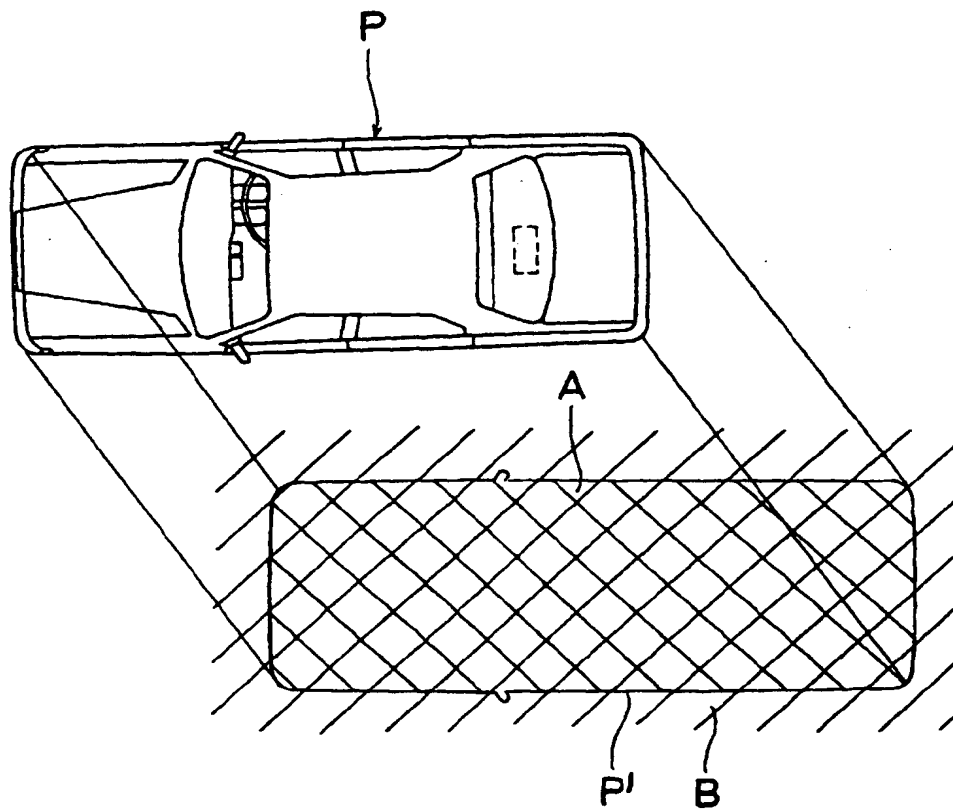


FIG. 2

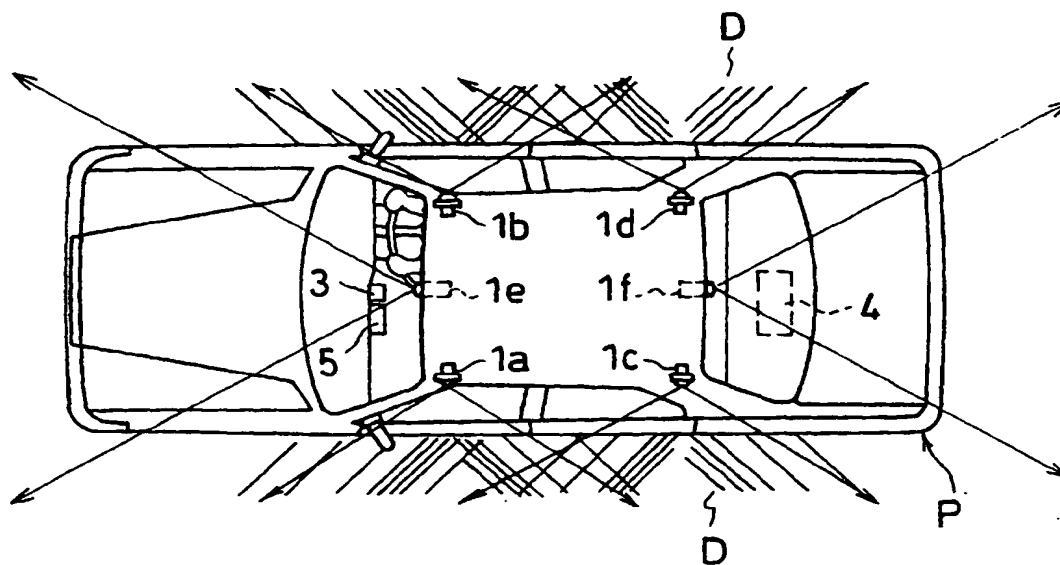


FIG. 3

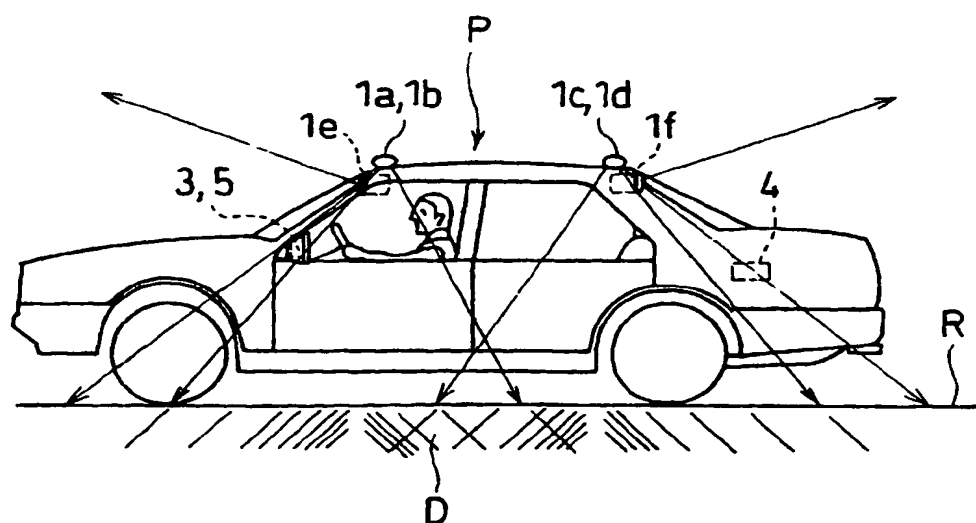


FIG. 4

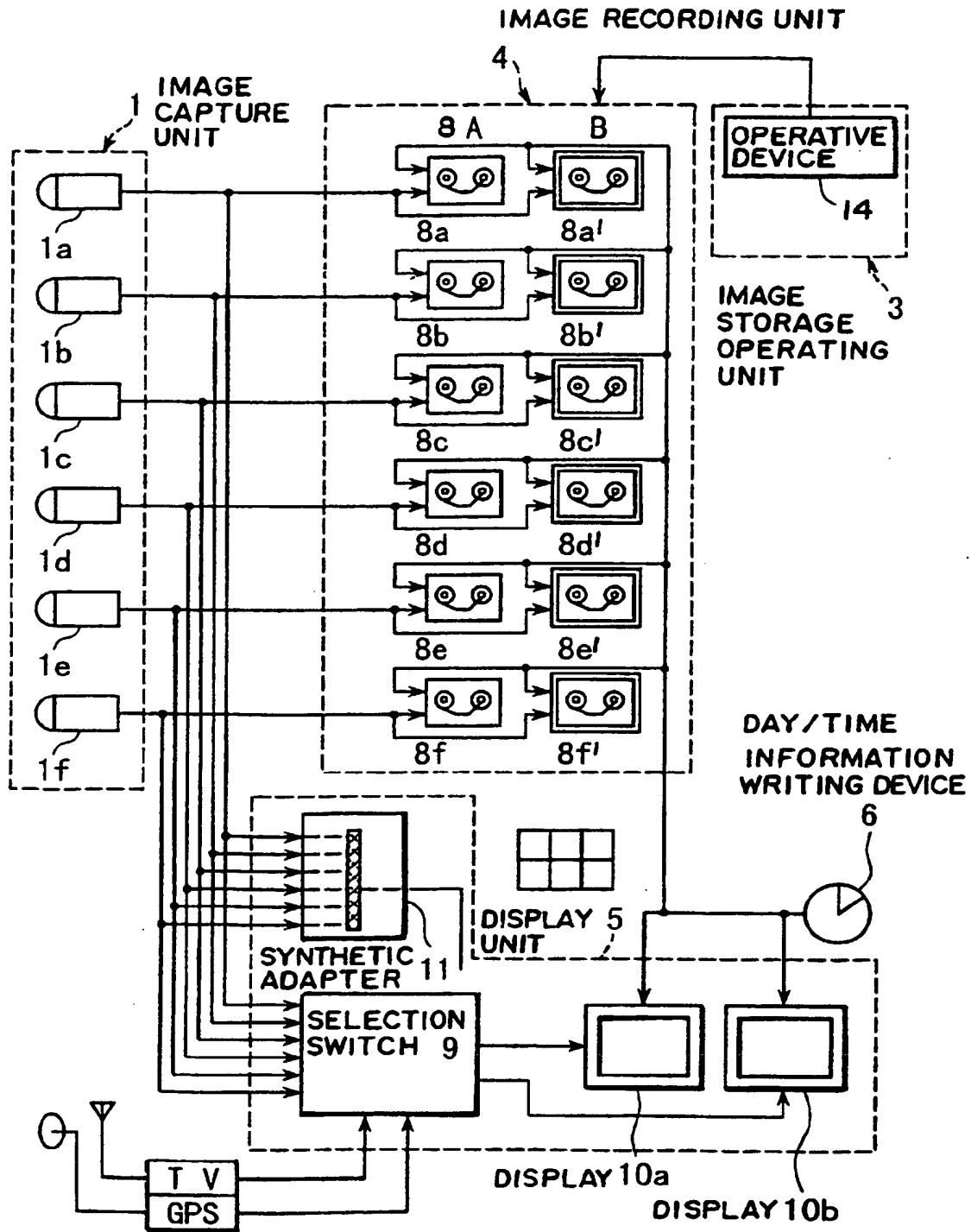


FIG. 5

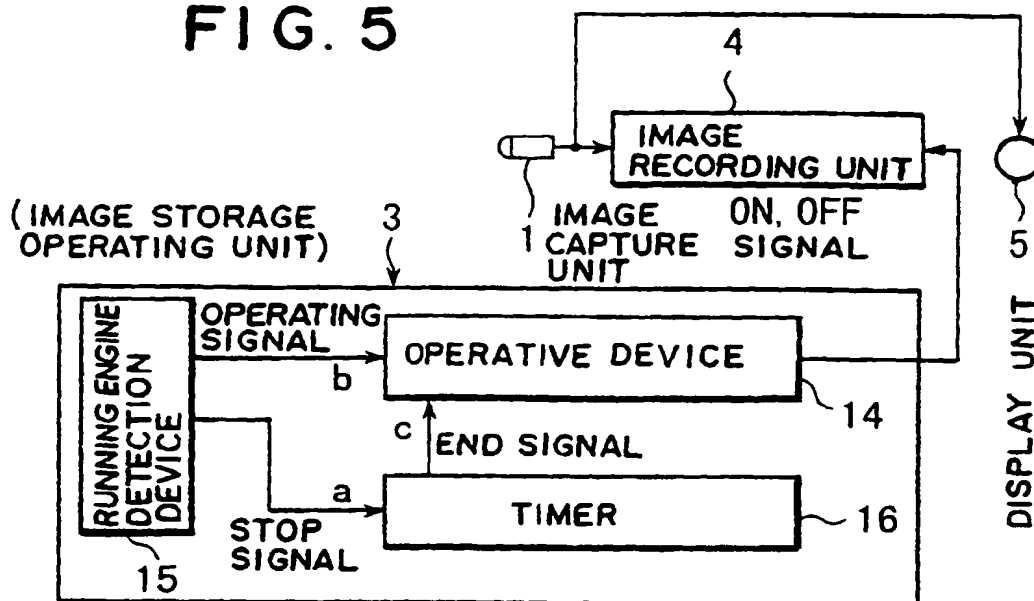


FIG. 7

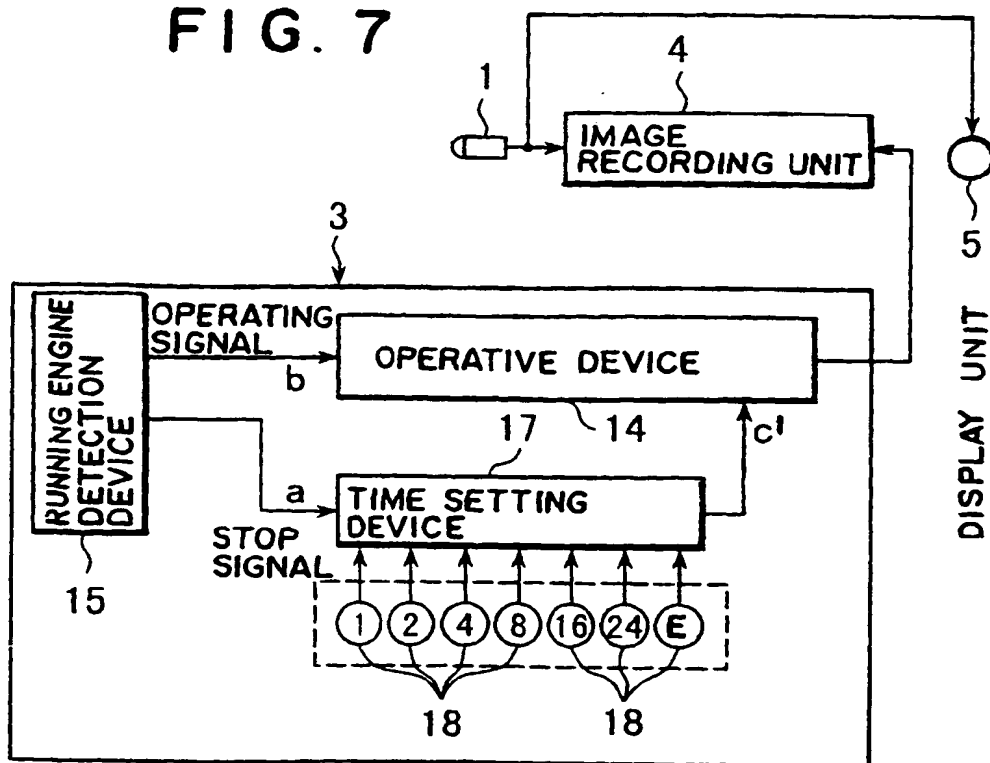


FIG. 6

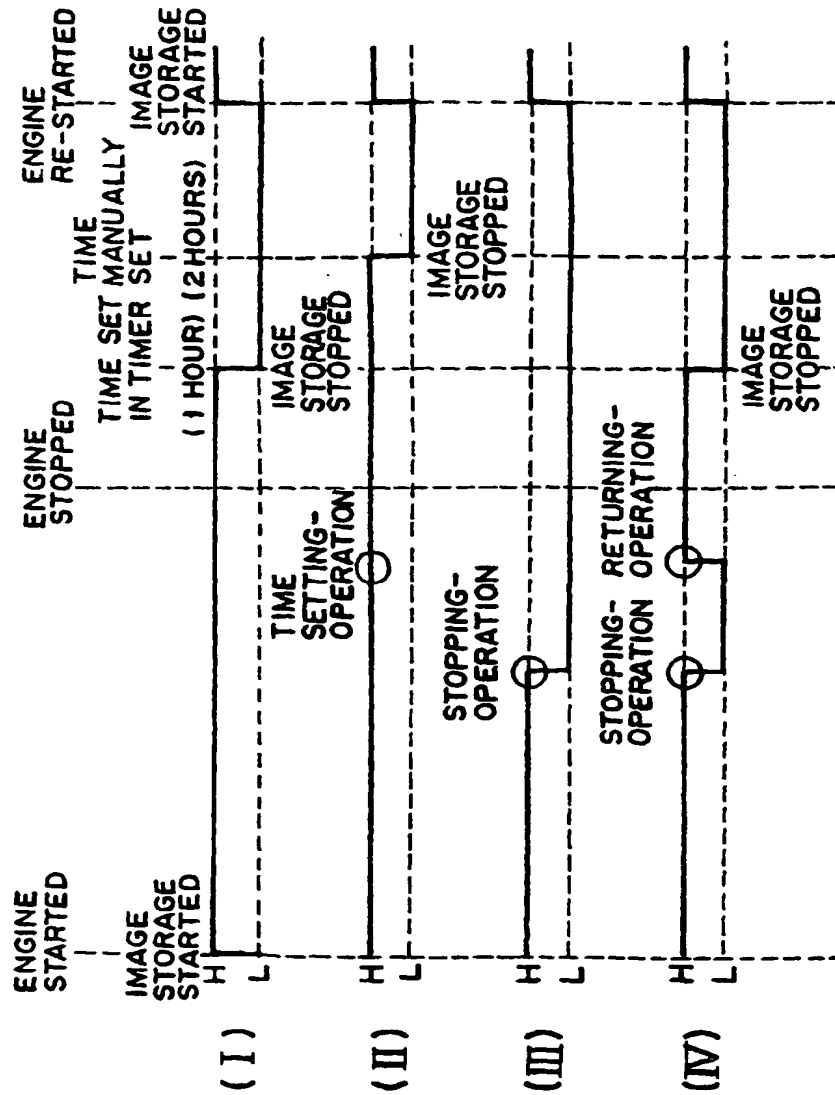


FIG. 8

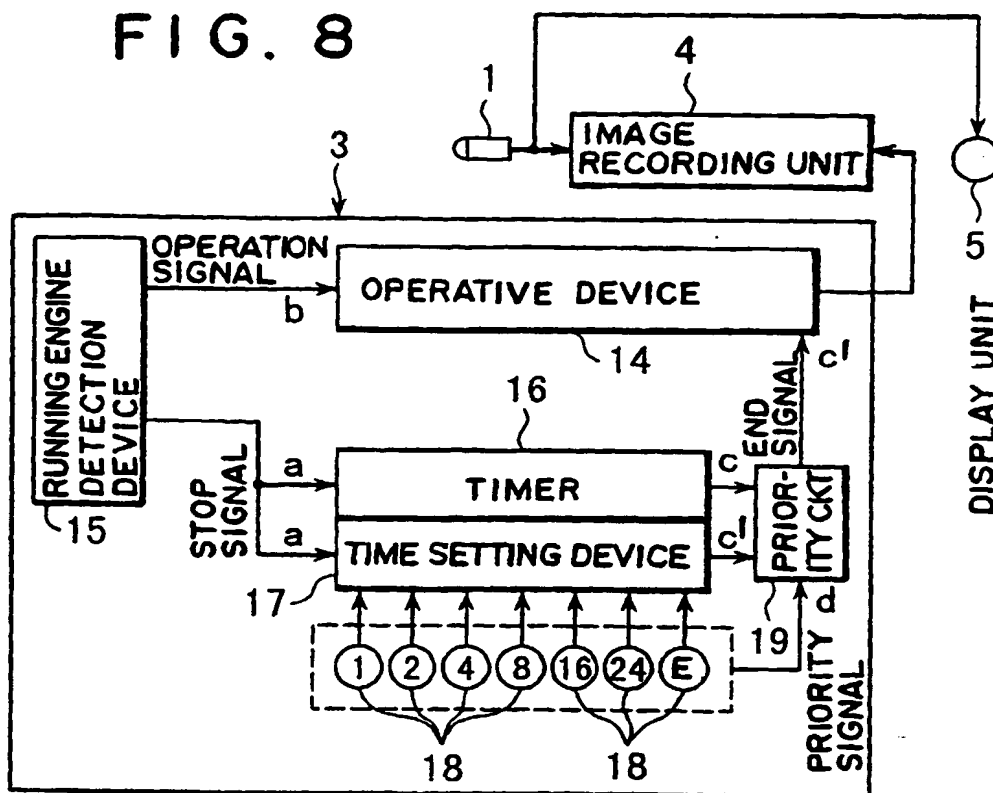


FIG. 9

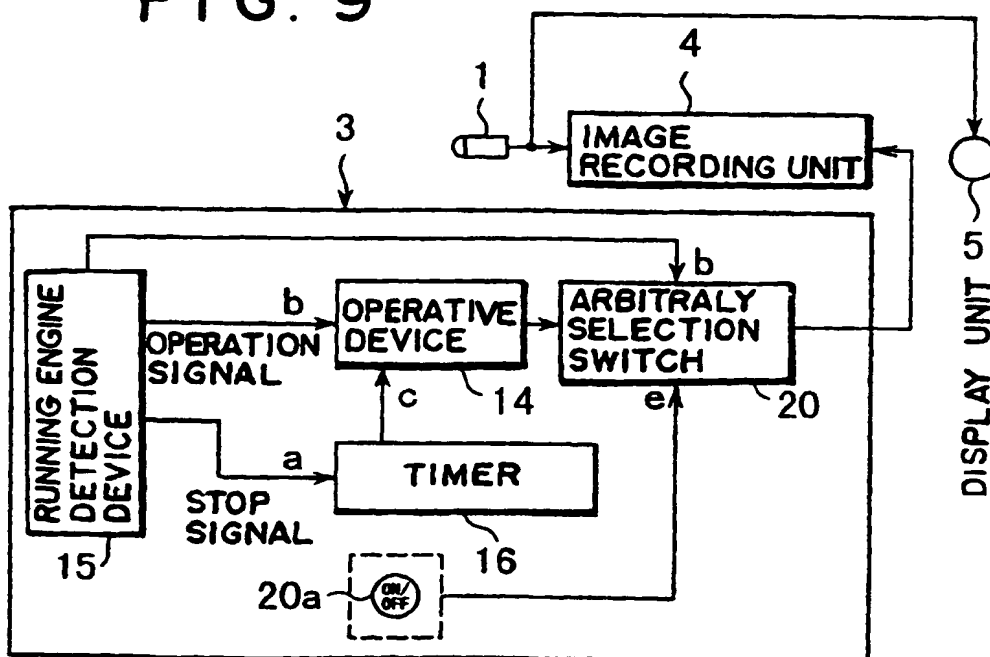


FIG. 10

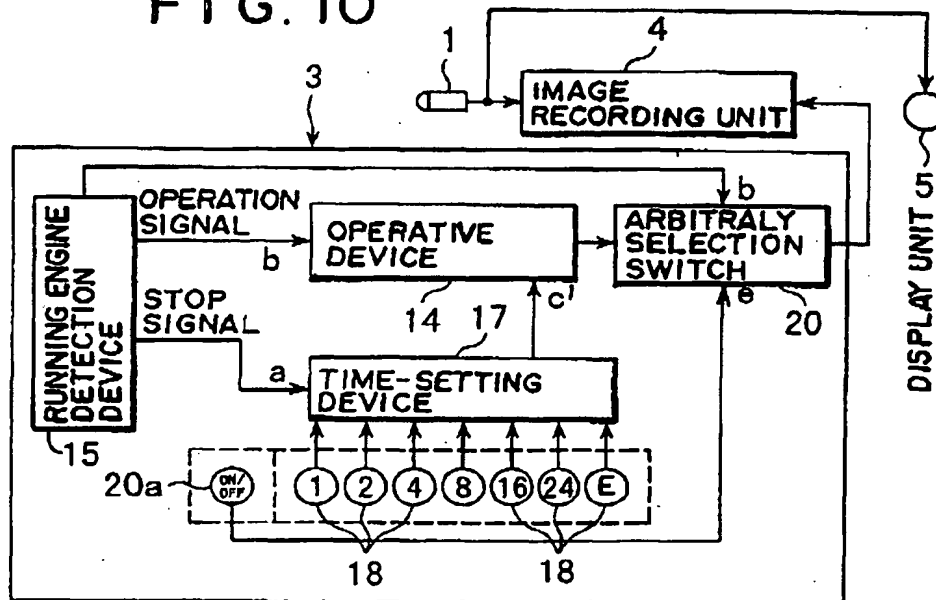
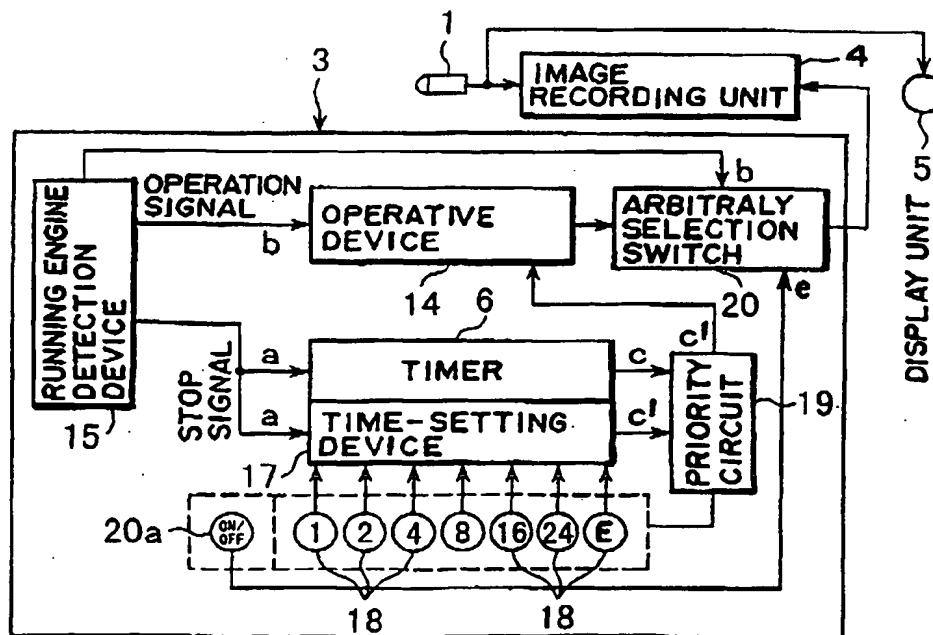


FIG. 11



This Page Blank (uspto)